Fixing the American Trucking Industry

An Honors Thesis (HONR 499)

by

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Abstract:

The American trucking industry is currently facing both a major shortage of truck drivers and an immensely high rate of truck driver turnover. These problems have remained persistent for over two decades, and are expected to worsen in the years to come. Every day, trucking companies are faced with a lack of capacity and increasing administrative costs. This paper attempts to analyze the trucking industry using economics, industry trends, and past failed solutions. The end goal of this paper is to present justified solutions for both the driver shortage and elevated driver turnover. These solutions aim to fix the problems themselves, and also to provide a sustainable plan of action moving forward. Additionally, these solutions aim not only to benefit trucking companies, but also the entire logistics industry and American economy.

Acknowledgements:

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I would also like to thank my wife Claire for her love, support, and toleration of all the late nights during this process.

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Introduction:

Modern business relies heavily on the logistics industry. Without transportation, companies would be unable to bring their products to the marketplace, crippling the world as we know it. Almost everything people use on a daily basis was transported by the logistics industry at some point in time. The most common method of domestic transport is trucking. However, the American trucking industry is currently facing both a massive driver shortage and high levels of driver turnover. Trucking companies often turn down large amounts of business due to a lack of capacity. As this shortage increases over time, the discrepancy between the supply and demand of trucks will continue to grow. This will only exacerbate the current shortage, causing larger and larger stresses on the entire economy. Many attempts have been made to reduce the shortage of truck drivers. These solutions range from increased fringe benefits, to free training and certification, to small increases in salary. However, these attempts have been largely ineffective. This thesis aims to look deeper into America's truck driver situation, and to pose potential solutions using industry data and economic principles. The solutions suggested aim to benefit both drivers and the logistics industry as a whole.

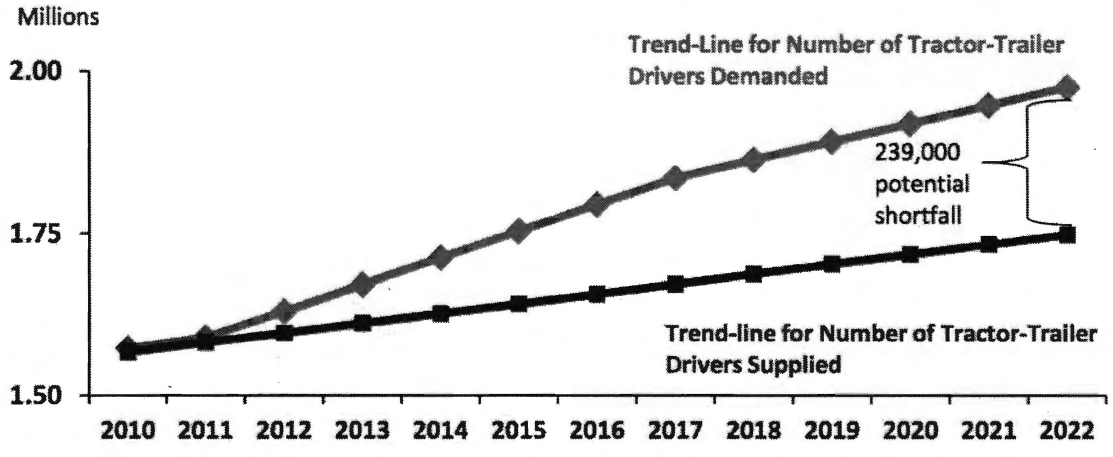
The formal structure of this thesis is as follows. The discussion begins with an identification of the specific problems affecting the trucking industry. As previously stated, these issues are a shortage of drivers and high rates of driver turnover. From there, the paper is divided into two main sections. Section one address the issue of the driver shortage. This section begins with an economic analysis of the truck driver labor market and the market for truck freight. From this economic analysis, the possibility of implementing a national truck driver minimum wage is explored, along with its potential benefits and implications. Section two aims to address the high

levels of driver turnover. This examination beings by exploring past attempts at reducing driver turnover, and by identifying ineffective efforts and unnecessary overspending. The driver turnover section will culminate with a proposed pay structure change that aligns more closely with that of the less than truckload shipping industry.

Identifying the Problem:

Increasing freight demands, paired with a relatively stagnant pool of truck drivers, has created a divergence between the number of truck drivers supplied and demanded. Current estimates place the deficit at roughly 48,000 drivers (Berman, 2015). This shortage of drivers is expected to grow to nearly 239,000 by the year 2022. This growing discrepancy is illustrated in Figure 1 below. This graph highlights the current driver shortage, as well as its expected growth going forward. Trucking companies have begun to turn down business and leave trucks parked as a result of the lack of drivers.

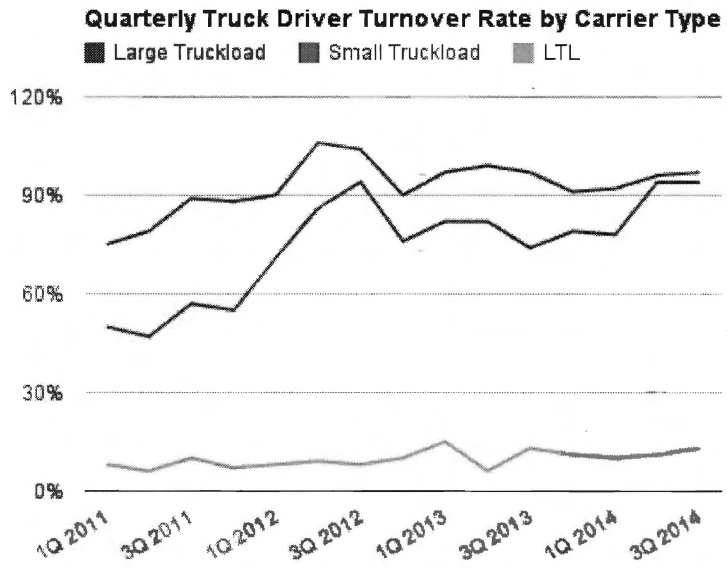
Figure 1:



(Badkar, 2014)

While the shortage of available truck drivers has dramatically affected the capacity of trucking companies, it is not the sole issue facing the industry. Truckload (TL) carriers are also experiencing extremely high rates of driver turnover, as shown in Figure 2 from the American Trucking Associations. Large truckload carriers are currently experiencing truck driver turnover that is consistently at or above 100% per year. Small truckload carriers are also experiencing high levels of driver turnover; however, these turnover rates tend to be less than those of large trucking companies. Less than truckload (LTL) carriers experience smaller rates of driver turnover, a fact that will be further examined later on.

Figure 2:



Source: American Trucking Associations

(Cassidy, 2015)

Although the shortage of drivers and the high turnover rate may seem like similar issues, they are actually two separate occurrences plaguing the industry. In a study done by Min and Lambert (2002), it was found that 86.7% of the truck drivers surveyed had 5 or more years of

driving experience. This means that the industry is suffering from "churning," or the moving of drivers from one firm to another. Therefore, with the driver turnover rate sitting at roughly 100%, Min's research highlights that "turned over" drivers most often move to another company, rather than leaving the industry all together. Drivers move between driving jobs frequently but do not tend to leave the industry. Therefore, trucking companies are suffering from both the inability to keep drivers with the company, as well as the inability to bring in new drivers to the industry. It is important to emphasize the fact that these two separate issues currently exist. Often times, the massive driver shortage and inflated driver turnover are presented as one in the same issue, but this is not the case.

Section One: Increasing the Number of Truck Drivers in the Industry

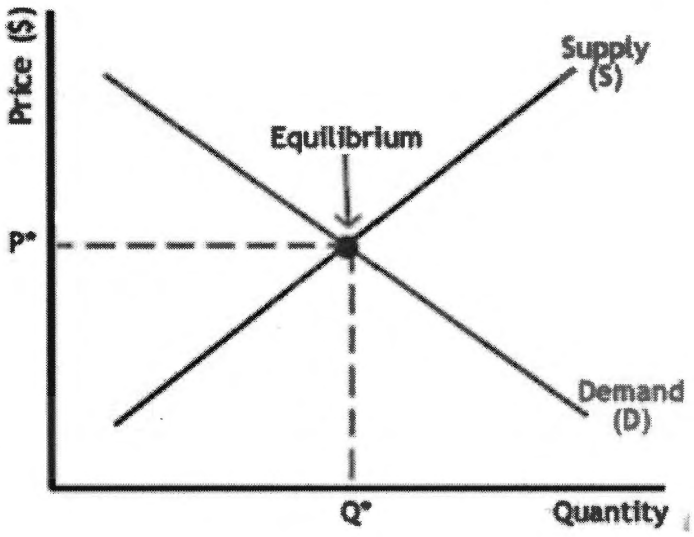
The first issue that must be addressed by trucking companies is increasing the amount of truck drivers currently in the industry. For this part of the analysis, the fact that trucking companies experience high driver turnover will be ignored. Instead, the sole focus will be attracting new drivers to the industry.

I: Economic Analysis of the Truck Driver Labor Market:

Much of the world can be explained through economic analysis. The labor market for trucking is no different. Under normal conditions, a market will reach its equilibrium point over time. This is the point at which the quantity supplied of a product is equal to the quantity of the product demanded (Figure 3). In this case, let us make our "market" the market for labor. More specifically, this is the market for truck driver labor. The supply curve represents the amount of truck drivers that are willing to work at every given wage rate. The demand curve is the amount

of truck drivers demanded by trucking companies at any given wage rate. In a normal marketplace, the quantity of truck drivers supplied and the quantity of truck drivers demanded would eventually reach the equilibrium point. At this point, every trucker that wants a job can find one, and trucking companies are able to hire all the drivers that they require.

Figure 3:

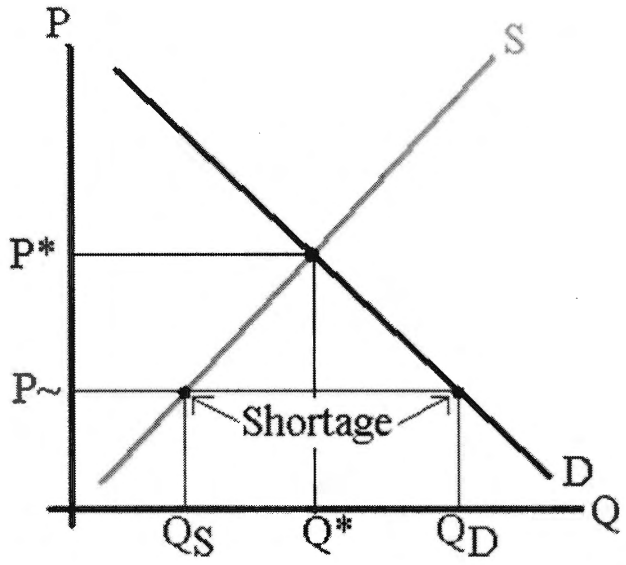


(Heakel, 2003)

However, the current market for truck drivers is experiencing a massive labor shortage. Reference Figure 4. In this case, truck driver wages are at a point (P~) which lays below the equilibrium wage rate (P*). Because the wage is so low, trucking companies are willing to hire more drivers (QD) than they would at the equilibrium price. On the other hand, since the wage rate remains depressed, there are fewer truck drivers willing to work at this price (QS). In a purely economic sense, when the price level falls below the equilibrium price, a shortage is created. This is evidenced by the difference between the quantity supplied (QS) and quantity

demanded (QD). In order to eliminate the truck driver shortage, the equilibrium price/wage for the market for truck driver must be reached.

Figure 4:



(Szulczyk, n.d.)

II: Contributing Factors:

The commonality between truck driver wages and the extent of the truck driver shortage is further evidenced through the study of the deregulation of the trucking industry in the 1980's and 1990's. In a study done by Engel (1998), it was stated that prior to deregulation 62% of truck drivers were unionized in 1973. After deregulation, only 23% of truck driver remained unionized in 1996. As deregulation continued and labor membership fell, price competition allowed carriers with cheaper non-unionized labor to easily win business over more expensive companies with unionized labor. This only sped up the depletion of unions. This report went on to cite that cost savings for trucking companies in a highly competitive environment have greatly impacted

truck driver salaries, which declined by nearly 40% between 1978 and 1996. This has led to a situation where "Increased demand and deteriorating wages have resulted in an industry that is plagued by frequent labor shortages" (Engel, 1998, p. 34). The negative effects of deregulation were also noted in a study done by Hirsch and Macpherson (1997) stating "Deregulation is associated with approximately a 15 percent relative wage decline among drivers employed in the for-hire sector, resulting primarily from decreases in union wages and a shift from high-wage union to low-wage nonunion employment" and "Deregulation has also affected employment, as evinced by a sharp decline in union density [and] slow employment growth in private carriage" (p. 1). Unions were a force that kept wages high and working conditions high. In their absence, trucking companies have fallen into a rut of unchecked price competition and deteriorating working conditions.

While it is obvious that truck drivers are leaving the trucking industry, it must be understood where they are going in order to set the minimum wage at an adequate level. According to Steve Banker (2013) of *Forbes Magazine*, past shortages in construction jobs have led to influxes of employees into the trucking industry. This references the direct correlation between the trucking and construction industries. Min and Lambert's (2002) study also addresses this fact, talking about how the trucking industry most often competes directly with the construction industry for labor, and that the tight labor market in the trucking industry is at least partially a result of the construction industry stealing labor. From these arguments, it becomes obvious that deregulation in the trucking industry caused a fall in union membership. This fall in union membership allowed trucking companies to increase their focus on lowering costs to stay competitive. An increased focus on costs caused wages to fall. Finally, this fall in wages resulted in an exodus of truck drivers from the industry, in all likelihood moving to the construction

industry. This is further supported by the fact that nearer to the time of deregulation, construction wages averaged $17.42 per hour while truck driving jobs averaged $15.93 per hour (Min and Lambert, 2002, p. 12). Although the average salary for a truck driver currently sits slightly higher than the average salary for a construction worker (roughly $5,000 per year more), the diminishing working conditions, increasing workload, and increasing amount of time spent away from home keep many construction workers from moving to the trucking industry. Construction employees work normal full-time hours and tend to be home every night. On the other hand, truck drivers spend most of their time driving and sleeping in a truck. A mere $5,000 is not enough to attract construction workers to the truck driving industry given current working conditions.

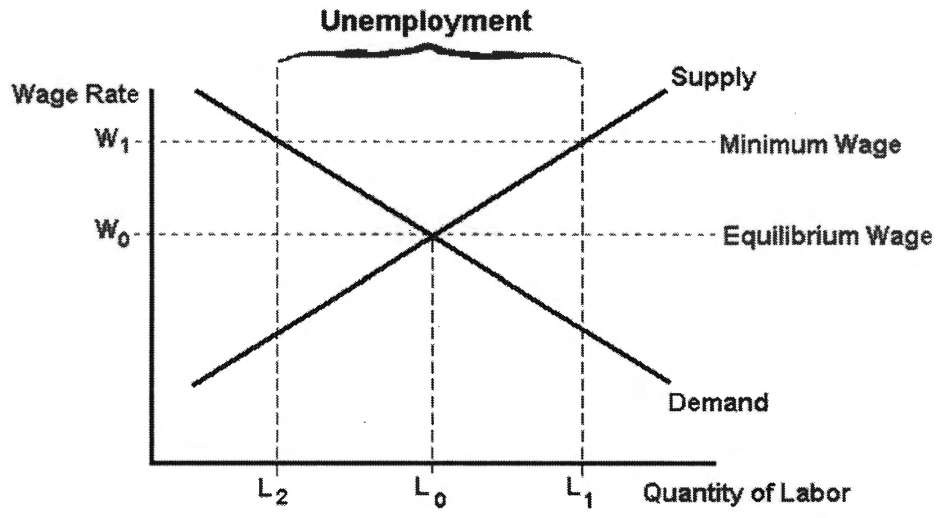
III: Solving the Shortage-National Truck Driver Minimum Wage:

Based on the analysis above, the economic problem occurring in the trucking industry is diminished wages. In order to remedy this situation, the federal government could implement a national truck driver minimum wage. This wage would be aimed at increasing truck driver employment, as well as providing a number of benefits to the logistics industry as a whole, such as faster intermodal development, increased freight capacities, and better service.

Normally, implementing wage floors or ceilings causes distress or imbalance within a market. Consider the typical use of minimum wage laws aimed at increasing the living standards of minimum wage employees. The market for minimum wage labor is already at or very near its equilibrium point. Therefore, there is no shortage of labor being experienced. Over time, this market has adjusted itself to remain at a wage rate where corporations have all the labor they need and nearly every employee who needs a job can find one. Refer to Figure 5. When the

minimum wage is increased, the wage rate in the market for minimum wage labor is elevated to a point (W1) that is higher than the equilibrium wage (W0). This in turn causes a surplus in labor. Because the wage rate has increased, companies cannot afford to employ as many employees as in the past. Therefore, some people get laid off. According to the American Legislative Exchange Council, "When the government imposes a higher minimum wage, employers face higher labor costs and are forced to respond by decreasing other production expenses. As these employers cope with the increased costs of a mandated wage raise, they often respond by cutting the jobs available to less-experienced and less-educated employees. The result is that these individuals, who already have few employment options, find it more difficult to get a job" ("Raising the Minimum", 2014, p. 1). Increasing the minimum wage benefits some employees who can keep their job, but hurts many others who lose their job. Usually, increasing the minimum wage in an attempt to benefit the lower classes does nothing more that increase the unemployment rate in the end.

Figure 5:



("Wise as", 2014)

Why then, should America implement a national minimum wage for truck drivers? Although the implementation of a minimum wage causes negative impacts within a market operating at equilibrium, it could serve to benefit one that is not at equilibrium. Refer back to Figure 4. The current labor market for truck drivers is existing below the equilibrium wage. Therefore, implementing a minimum wage would in theory move the wage for truck drivers closer to the equilibrium, reducing the shortage of drivers. When the minimum wage is increased for normal labor markets, the new wage level moves the labor market out of equilibrium. However, implementing a minimum wage for truckers would do the opposite of this. It would take an imbalanced labor market and move it closer to its equilibrium point.

This raises the question of "why don't trucking companies raise wages in order to solve the labor shortage?" The answer to this is simple. According to Min and Lambert (2002), "The rationale may be that severe price competition (especially in the truckload market) does not allow trucking firms to raise their freight rates to the level where they can fully recover the cost associated with driver wage increases" (p. 13). The market for shipping, particularly truckload logistics, is a very commodity-like marketplace. Commodities are goods that are bought on price alone. One of the most common examples of a commodity good is gasoline. People generally do not care which brand of gas they buy, so long as it is the cheapest. All gas works the same, and there exists very little to differentiate one brand of gas from another. The market for truckload shipping is very similar. In an MIT study on the productivity of US transportation, Parming (2013) stated that "Prices are a central way in which firms compete with each other…" (p. 10). In the end, all that a trucking company has to sell is a service that moves goods from point A to point B. All goods are carried on nearly identical trucks, at nearly identical speeds, on the same roads. The decision to choose one trucking company over another is based almost solely on the

price that the companies are charging. Goods will not get to their destination any faster or safer. This is noted by Rodrigue and Notteboom (2013) in the book *The Geography of Transport Systems*, saying "Shipping lines have developed an intense concentration on costs and on negotiated long term contracts…" (p. 4). In a normal market, companies develop and advertise new products. These products create competitive advantages and additional sources of profit for firms. If there was a labor shortage in the smartphone industry, a company could theoretically develop a better product in order to justify the higher prices necessary to finance increased wages. Additionally, they could enter a new market to create additional revenue streams that would finance higher wages. Trucking companies do not have this luxury. If a trucking company was to increase wages, the cost of shipping would immediately go up. Since trucking companies are locked in a perpetual price war, increasing prices would have a large effect on a company's amount of business, leaving a trail of "…uncompetitive companies that went bankrupt" (Parming, 2013, p. 18). Over time, trucking companies have dug progressively deeper into their price war. This intense concentration on pricing is reflected in stagnant driver pay, decreasing working conditions, and shrinking profit margins.

To this point, numerous trucking companies have raised wages in an attempt to increase driver employment. However, because of the intense price competition between companies, these pay increases have been minimal. Small pay increases are enough to cause a current truck driver to move to a different company (turnover/churning); however, wages are still not at a level that allows the trucking industry to effectively compete for labor. This situation is illustrated in the conclusions of Min and Lambert's study. Min and Lambert (2002) found that small increases in pay were not effective in driver retention. However, the study did find that companies paying substantially larger salaries enjoyed significantly reduced driver turnover. In conclusion, the

intense price competition in the trucking industry has only permitted trucking companies to afford modest pay increases. However, these modest pay increases have not been substantial enough to attract drivers from the construction industry. The slight pay advantage enjoyed by a truck driver is not enough to compensate for the long hours and time away from home, neither of which are issues for construction workers. Because the current pricing environment has prohibited trucking companies from increasing salaries to a high enough level, the implementation of a national truck driver minimum wage is necessary to level the playing field. In the current market environment, it is remarkably easy for a trucking company to price themselves out of the market by raising wages. The minimum wage would allow trucking companies to raise truck driver wages significantly without putting the firm at a disadvantage. Instead, the prices and payroll for all companies would rise equally.

IV: Implications:

While raising the national minimum wage for truck drivers could lessen the truck driver shortage, the implications of making such a decision must be evaluated. When the price of inputs (labor in this case) for a product increase, the overall cost of the product or service in question will increase as well. Although rising prices seem like a detrimental impact on the on the trucking industry, the concept of demand elasticity, or responsiveness of customers to price changes, must be considered.

Demand elasticity deals with the sensitivity of consumers to price changes. The demand for trucking is inelastic, or unresponsive to price changes. This means that even if shipping prices increase, most customers will continue to utilize truck freight. Only a few will opt for other modes. Trucking demand is unresponsive to price changes due to increasing demand and a

lack of substitutes (Rodrigue and Notteboom, 2013, p. 4). This concept was addressed by Litman (2013) in a Danish study done by the Victoria Transport Policy Institute, stating "The price elasticity of freight transport (measured in ton-miles) in Denmark is calculated to be –0.47, while the elasticity of freight traffic (measured in truck-kilometers) is –0.81… A 10% increase in shipping costs reduces truck traffic by 8%, but total shipping volume by only 5%. Some freight is shifted to rail, while other freight is shipped using existing truck capacity more efficiently" (p. 55). Another study done by the US Department of Energy on the demand elasticity of truck freight can be seen in Figure 6 below. Similar to the Danish study, this study estimated the demand elasticity of US truck freight to be on average approximately -.80, which is fairly inelastic. Therefore, rising truck freight prices will have a fairly small impact upon the quantity of truck freight demanded.

Figure 6:

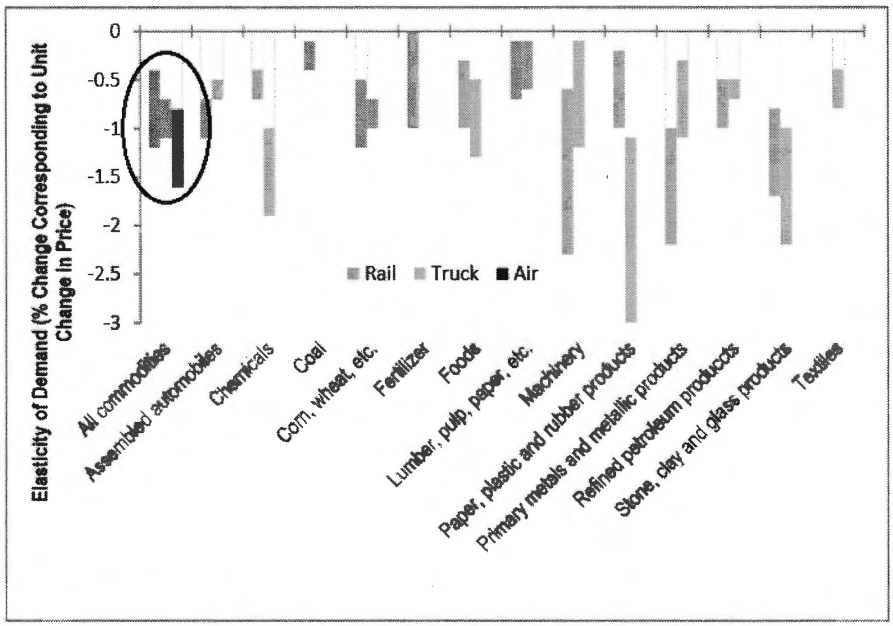


Figure 4.1. Most likely range of elasticities of demand for freight transport

("Freight Transportation", 2013)

Now let us consider the customers that do switch modes of transport. As of right now, the only practical options for transporting bulk quantities of goods are trucks, boats, trains, and planes. These 4 potential modes of transportation are known as substitutes to each other. If one mode becomes unavailable, too expensive, or impractical, the others exist as potential option. At this time, planes remain very expensive as a mode of transportation. Unless the cargo being transported is high value and time sensitive, air logistics remains a poor option for domestic shipments. Also, there is very little freight that presently moves by truck that could be moved by inland waterways instead. Most inland water freight consists of bulk product such as coal or iron ore. This type of freight almost never moves by truck in the first place. Trains on the other hand remain a somewhat viable option for transport. However, while trains may present a practical substitute for some shippers, it remains impractical for others. American train, or intermodal, logistics is still continuing to grow and evolve. In an article for *Inbound Logistics*, Terreri (2004) quoted James McCarville, executive director of the Port of Pittsburgh Commission, saying "The [intermodal] infrastructure is reaching the limits of its capability" and "We see a crisis coming and it looks like when it gets here it will be with us for a long time" (p. 1). Intermodal logistics, while cost effective and environmentally friendly, remains impractical for many shippers in America due to a lack of accessibility and infrastructure in small markets. This is evidenced in Figure 7 provided by the US Department of Energy. Figure 7 displays the probability of various modes of transportation switching to other modes. This table places the chance of truck freight changing to air or water freight at low to moderate levels, and the chance of it switching to intermodal at a higher level. According to the American Truckers Association, nearly 70% of all freight moved in America is moved on trucks ("Reports, Trends", n.d.). If the cost of trucking increases due to an increased minimum wage, it can be reasonably expected that some customers

will switch to intermodal freight while very few will switch to air or water freight. The rest will remain trucking freight customers.

Figure 7:

Table 4.1. Freight Modal Shift Potential

From \ To	Truck	Rail Carload	Rail Intermodal	Air	Water
Truck	–	◑	●	○	◑
Rail Carload	◑	–	○	○	◑
Rail Intermodal	●	○	–	○	◑
Air	○	○	○	–	○
Water	◑	◑	◑	○	–

Key: Limited Potential ○ → ◑ → ● Strong Potential

("Freight Transportation", 2013)

The inelastic demand for truck freight has two serious implications when considering a minimum wage increase and the subsequent rise in freight prices. Consider producers that possess the ability to switch to intermodal logistics. These may be producers that previously used over the road logistics due to a lower price or perceived increase in timeliness or security. If the price of truck freight increases, and it becomes practical and more cost effective for certain companies to use intermodal transport, they will switch. The switch to intermodal logistics has two notable benefits for the logistics industry. First, many large over the road trucking companies offer intermodal services. Companies like Celadon Trucking, Swift Transportation, JB Hunt, and Knight Transportation all offered intermodal services as part of their product

portfolio. Therefore, any loss in revenue resulting from customers switching from over the road trucking to intermodal logistics will often times go right back to the same corporations, resulting in minimal to no lost revenue. Also, consider the impact that the increased cost of trucking could have on intermodal development. Intermodal transportation is very beneficial for a number of reasons. According to Jeffrey R. Brashares (2013) of *Inbound Logistics*, the benefits of intermodal logistics can be summed up as follows:

- **Lower costs.** Shippers can take advantage of lower rates, more predictable pricing, and the flexibility of loading and unloading goods in a dropped trailer environment, which reduces handling costs.
- **Environmentally friendly.** Shippers can significantly reduce their carbon footprint by going intermodal, because trains only emit approximately 5.4 pounds of carbon dioxide per 100 ton-miles, whereas trucks emit approximately 19.8 pounds.
- **Reliability, capacity, and safety advantages.** Shippers have more access to equipment and standardized transit schedules. As companies move their freight to intermodal, there is also the opportunity to streamline their reverse logistics, providing additional savings. (p. 1).

Consider the cost of labor. In a normal trucking environment, one truck driver can transport one trailer. However, in the case of intermodal transport, one engineer can transport a hundred or more trailers. Not only is this much more efficient from a labor standpoint, but it also helps to decrease the amount of greenhouse emissions produced by the logistics industry. Instead of dealing with the emissions of 100 trucks, intermodal allows the same amount of freight to be

moved while expelling the emissions of one or two train engines. Intermodal logistics is also known for its increased security, timeliness, and ability to deal with inclement weather. Intermodal transport offers a much better form of transport for many reasons; however, a lack of access and capacity leaves it an unavailable option for many shippers. Therefore, any trucking business that is lost due to increased prices will most likely move to intermodal transport, since it is the only practical substitute for over the road trucking. This increased amount of intermodal transport will both return revenue back to many trucking companies who offer intermodal service, as well as provide an impetus for increasing the development and infrastructure of America's rail networks. According to Zografos and Recker (2003) of the Transportation Research Board, intermodal transport "…will become increasingly important, driven by congestion and environmental concerns, the changing requirements of global supply chain systems, and the rapid advancement of information and communication technologies" (p. 3). Although the minimum wage's tendency to deter some customers from using trucking freight may seem problematic, it is not. It can be expected that most of these shifts will be shifts to the intermodal industry. This will in turn spur the growth of a much more efficient and eco-friendly mode of transport, providing a sustainable solution to American logistics for decades to come.

Also, consider the resistivity of customers to price changes. A lack of truck drivers has caused a lack of capacity amongst trucking companies. In an article for the *Wall Street Journal*, Chao (2013) quotes the Council of Supply Chain Management Professionals as saying "…the trucking industry edged even closer to 100% utilization…" and that "…truck capacity has grown extremely tight" (p. 1). The current supply of trucking freight has a maximum capacity. The driver shortage has resulted in a finite number of available drivers, and at a certain point trucking companies do not have enough drivers to fulfill demand. If the amount of available truck drivers

was to increase due to a minimum wage implementation, this could also represent a potential increase in capacity amongst trucking companies. Since customers are relatively un-sensitive to price increases for truck freight, and a higher minimum wage could signal an increase in capacity, trucking companies have very strong odds of increasing revenues over their current levels. Additional capacity also leads to potential benefits for the economy as a whole.

Decreased capacity in the trucking industry has caused issues with customer service levels. As Figure 1 shows, there is an increasing divergence between the demand and the supply of freight. The *Indianapolis Business Journal* quotes US Xpress CEO Eric Fuller saying that the average carrier sees"...anywhere from 5,000 to 8,000 orders a week that we're turning down that our current customers are actually offering us" ("Trucking Companies", 2014, p. 1). The implication of this is that some manufacturers are unable to have their goods shipped in a timely or reliable manner. American Trucking Associations' Chief Economist Bob Costello was quoted by Meyers (2015) as saying "Almost 70 percent of freight tonnage in the United States moves on a truck...when this is an issue for the industry, it's an issue for the economy as well" (p. 1). Companies rely upon trucking companies to move their goods to the marketplace. Without enough capacity, trucking companies are unable to ensure on-time deliveries. This affects not only the trucking industry, but the reputation and customer service of America's producers as well. *Inbound Logistics* reiterated the importance of on-time and reliable freight, citing trucking's far reaching effects both upstream and downstream in a company's supply chain ("Supply Chain Gain", 2011). When a producer cannot rely upon the availability or timeliness of freight shipments, it becomes incredibly difficult to properly structure and execute an effective supply chain. Implementing a national minimum could potentially serve to increase the capacity

of trucking companies, therefore promoting more reliable transportation services which would benefit the economy as a whole.

Section 2: Reducing Driver Turnover

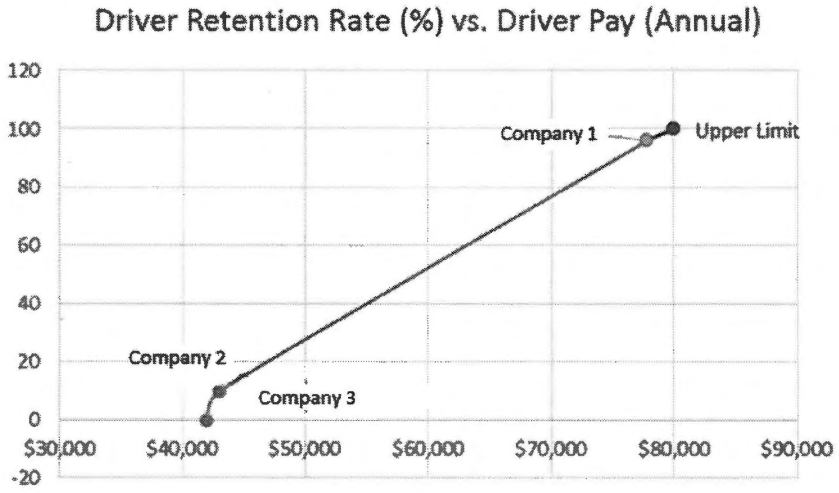
Currently, job turnover of full truckload drivers sits at or near 100% per year on a consistent basis. Most of this turnover results in "churning," or the movement from one trucking firm to another. While this may seem insignificant, it poses a large unnecessary expense upon trucking companies in the form of hiring and firing costs. Another fact to consider is the relatively normal rates of driver turnover experienced by less than truckload freight carriers. Studying the inherent similarities and differences between truckload and less than truckload carriers can provide insight into the causes of driver turnover.

I: The Relationship between Turnover and Administrative Costs:

It is often forgotten that there are costs associated with the hiring and firing of employees. These costs can include anything from severance pay to sign-on bonuses, corporate recruiter salaries, training, idle equipment, etc. According to a study done by the Upper Great Plains Transportation Institute, the cost of turnover per employee can be roughly estimated at $8,200 (Rodriguez, Kosir, Lantz, Griffin and Glatt, n.d., p. II). This number factors in hiring and firing costs, searching costs, insurance/legal costs, idle equipment costs, etc. When this figure is multiplied by the total amount of drivers in a firm (100% turnover), the estimated yearly hiring and firing costs are immense. If a moderately sized trucking company employs 100 drivers, this company can be expected to lose roughly $820,000 per year on hiring and firing expenses alone.

Based on the argument above, a large amount of truck driver job satisfaction comes from increased wages. In a purely economic sense, increasing the wages of truck drivers should theoretically increase the quantity supplied of truck drivers. Although industry wage and turnover data remains relatively difficult to find, research was able to uncover three industry data points. These points show the wage level of each of the three companies, as well as their respective yearly retention rates. See Figure 8 below. When plotted, these data points show an inverse correlation between wage rates and turnover rates. As the wage of drivers increases, the expected turnover of those drivers decreases. Although these are only three data points, an important trend is highlighted. Generally speaking, these data points show that increasing wages will decrease turnover. This is strictly economic logic and ignores the fact that these companies each possess a different company culture, benefits, lifestyle, etc. Regardless of whether or not the intangibles of each company are considered, these data points show that increasing wages can reduce turnover.

Figure 8:



(Bright *et al.*, 2015)

According to the analysis in Section one, companies do not have the means to raise wages. The intensely competitive environment present in the trucking industry has caused a fall in both margins and wages. Consider the hiring and firing costs associated with turnover. If a company can save $8000 per year by keeping an employee at the same company, this is $8000 that the trucking company now has to put towards salary expenses. Although the given data set is incomplete, it works as a proof of concept. As wages are increased, the amount of driver turnover can be expected to fall. When this concept is applied in tandem with a national truck driver minimum wage, the cost savings associated with lower turnover rate can significantly reduce the impact of higher wages upon trucking companies. According to their website, Werner currently employs roughly 8,750 drivers ("Search For", n.d.). If a heightened minimum wage was successful in reducing driver turnover by 20%, this would represent a cost savings of nearly $14 million per year. If Werner was able to reduce driver turnover to 15%, which is similar to most LTL carriers, a potential cost savings of $60 million per year is possible. Not only does a national minimum wage for truck drivers have the potential to raise revenues and increase intermodal development, but it could also lead to a dramatic decrease in administrative fees associated with driver hiring and firing resulting from less driver turnover.

In the absence of a national minimum wage for truck drivers, or in an effort to further increase truck driver wages, trucking companies have the ability to cut unnecessary costs. Cutting unnecessary costs will allow more funds to be applied towards driver's salaries. Applying more funds to driver salaries will aid in turnover reduction. Ineffective advertising and training costs may be candidates for cost reduction. Min and Lambert's (2002) previously discussed study included an analysis on the factors that affect the effectiveness of driver recruitment. According to this study, the most effective method of driver recruitment was found

to be word-of-mouth referrals. On the other hand, the two least effective methods of driver recruitment were found to be advertisements in professional magazines and advertisements on radio/TV. Min also stated that these results closely mirrored those found in a similar study done by the Gallup Poll. The two least effective methods of recruitment also happen to be the most expensive forms of advertisement, especially considering that social media advertising is relatively low cost, if not free. If truck driver wages are increased to a certain level, word of mouth advertising and job posting boards will likely suffice.

Another shocking instance of ineffective overspending is in free driver training. Min and Lambert's (2002) study ran an analysis on the factors affecting driver recruitment and retention. Of the 12 factors analyzed on this list, the least important factor to overall driver retention was found to be the availability of free on the job training stating "...insufficient truck driving schools are not considered a serious obstacle for driver recruitment and retention" (Min and Lambert, 2002, p. 12). Min's study also analyzed the obstacles to effective driver recruitment and retention. Similarly, these results also showed that a lack of truck driving schools was not considered to be a major issue. Building and operating a facility that offers free driver training comes at an immense cost. However, building and operating a free driver training schools seems to miss the root of the driver retention issue. Section one of this thesis showed that driver pay presents the most effective solution for driver recruitment and retention. Min and Lambert's (2002) study showed that a lack of truck driver training was not a major factor in driver retention. Therefore, the cost associated with free driving schools would be better allocated to driver pay.

Also, consider the fact that the TL and LTL industries employ nearly identical employees with the same training and certifications. A major discussion occurring in the trucking industry revolves around the idea that a lack of training is causing driver turnover and recruitment issues. However, this assertion seems fairly illogical when the turnover rate of LTL carriers is examined. Both LTL and TL drivers need training and certifications in order to operate relatively similar equipment. Due to the similarity of the certifications and equipment used, there exists a substantial cost associated with training, regardless of whether a driver is a TL or LTL driver. Drivers in both industry sectors are responsible for driving full size semi-trucks and must possess a CDL. With that being said, Cassidy (2015) cited the American Trucker's Associations saying that for large TL trucking companies, the average driver turnover in 2014 was 96%. Comparatively, the ATA said that LTL freight carriers experienced turnover in the 10-15% range annually. Even if there are slight discrepancies in the training program for LTL and TL drivers, this cost/difference cannot account for an 85% difference in turnover rates alone. There is no strong evidence to support the fact that a lack of training facilities contributes to the increased driver turnover.

II: Decreasing Turnover Utilizing a Re-Aligned Pay Schedule:

The current pay structure of the trucking industry is unlike any other industry. Most truckload carriers pay their drivers on a per mile basis, as opposed to an hourly wage or conventional salary. While this pay scale may seem justified in travel based industry, it may actually work against corporations who are currently struggling with high rates of driver turnover. Refer back to Figure 2. Notice the immense discrepancy between the turnover rates of TL and LTL carrier companies. The significance of this fact is frequently overlooked

completely. Both LTL and TL companies employ similar employees with similar certifications, yet one sector of the industry experiences very high employee turnover while the other experiences relatively normal turnover. In order to fully understand the source of this discrepancy in turnover rates, let us examine significant differences between the TL and LTL industries.

Regardless of whether a driver is employed by an LTL or TL carrier, the basic functions of the job remain nearly identical. The overarching commonality between both jobs includes picking up, transporting, and dropping off freight in a large truck. However, TL companies suffer from very high turnover rates while LTL carrier experience much smaller turnover rates. One main difference between LTL and TL carriers is the pay structure used to compensate drivers. In most TL environments, drivers are paid on a per mile basis. The longer the haul that the driver must complete, the more he/she will be paid. On the other hand, in most LTL environments drivers are paid on a per hour basis. This is due mainly to the nature of the work done by LTL drivers. LTL drivers spend much of their day driving from location to location, picking up and dropping off partial truckloads. Because these drivers do not drive many miles in a day, spend a lot of time in traffic, and have more frequent stops for loading and unloading, it becomes impractical to pay them on a per mile basis.

In Min and Lambert's (2002) study examining the current truck driver shortage, a survey was taken of the perceived importance of various factors to driver retention. These factors affecting driver retention, listed in order of importance are as follows:

1. Competitive pay scales
2. Condition of equipment
3. Company reputation
4. Amount of time not on the road

5. Fringe benefits
6. Less waiting time at dock
7. Job security
8. Sufficient time for rest
9. Less loading/unloading
10. Freedom from direct supervision
11. Advancement opportunity
12. Free-on-the-job training

In an effort to pinpoint the cause of the discrepancy between LTL and TL turnover rates, let us examine the list further. On this particular list, three items jump out as being significantly worse in a TL environment than an LTL environment. These items are amount of time not on road, sufficient time for rest, and advancement opportunity.

First off, the amount of time not on the road is severely less in a TL environment. Because many loads are traveling across the country, drivers must live in their trucks for days at a time while transporting loads. On the other hand, LTL drivers only travel short distances each day, returning home every evening. Secondly, sufficient time for rest is lessened in a TL environment. Because TL drivers are living in their trucks on the road, nights are oftentimes short and restless. Conversely, LTL drivers work relatively normal hours, returning home each evening. Lastly, advancement opportunity is severely impacted in a TL environment. In order for LTL drivers to advance, all the company must do is increase their hourly rate. This will allow LTL drivers to make more money, while still retaining the same amount of home time. On the other hand, the adherence to a per mile pay structure by TL companies seems to work as a reverse incentive for more senior drivers. As drivers in TL firms gain seniority, their rate earned per mile increases. However, in order to maximize the potential of this pay increase, drivers must continue to accept long haul, high mileage, trips.

The implementation of an hourly pay scale for TL carriers is a beneficial adjustment to make. If TL carriers paid on a per hour basis, they would possess the ability to raise per hour driver pay as seniority increased. Additionally, since the number of miles driven becomes meaningless in a per hour pay system, TL drivers would desire shorter hauls over longer hauls. Therefore, these companies could promote driver advancement by offering senior drivers short hauls. This solution does not solve the issues relating to driver recruitment or incentivizing long hauls; however, it can help reduce turnover by promoting longevity at a single company. The Upper Great Plains Transportation Institute stated that there exists "…a strong desire for some form of career path (advancement) by drivers. A challenge for the industry will be to define the job of driving in a way which provides this. Differing pay scales, better schedules, and bringing drivers home more often could be a means of differentiating one driver from another" (Rodriguez et al, n.d., p. 5). A per hour pay scale for TL companies would allow for genuine career advancement that addresses all of a driver's needs. This would allow drivers to earn more money, without forcing them to concede home time in order to take advantage of higher pay per mile.

Conclusions:

In all, two major issues affecting the trucking industry have been identified and analyzed. The current shortage of truck drivers can be economically attributed to sub-par wages. In a fairly un-unionized environment, wages have continued to remain suppressed in the face of increasing price competition between carriers. This price competition has eliminated the ability of trucking companies to raise wages substantially enough to compete with other industries, most often the construction industry, for labor. In order to solve this issue, the implementation of a national

truck driver minimum wage is suggested. This minimum wage could not only quell the driver shortage, but could also promote the health and sustainability of the logistics industry and the American economy as a whole. The increased freight costs resulting from a minimum wage implementation would spur the growth of intermodal transport, the primary substitute for trucking freight. Intermodal freight represents a vastly more sustainable, efficient, and eco-friendly mode of transportation both now and into the future. Additionally, the increased minimum wage could increase trucking capacities. This can be expected to lead to increased reliability and customer service across the trucking industry as a whole. Due to the integral relationship between reliable transportation to the upstream and downstream paths of a company's supply chain, an increase in service levels can be expected to benefit the production companies of America as well. While the increase in freight prices attributed to a minimum wage may seem detrimental to the trucking industry, the inelastic nature of trucking demand paired with the fact the many trucking companies offer intermodal services actually presents a potential benefit for many companies.

Secondly, the immense driver turnover being experienced in the trucking industry is resulting in heighted administrative costs in the form of hiring and firing costs, advertising costs, training costs, idle equipment costs, etc. Research has illustrated a positive relationship between increasing salaries and increased retention. The implementation of a national minimum wage for truck drivers would serve not only to reduce turnover, but also to reduce related administrative costs. These saved costs could then be re-invested in driver salaries, completing the cycle. Research also deemed certain driver recruitment methods to be both expensive and ineffective. The use of expensive advertising campaigns, as well as the construction and operation of free driving schools, both come at an immense cost. Additionally, the relative ineffectiveness of these

methods, when compared to the effectiveness of heightened salaries, proves that this money would be better spent on wages.

Similar research showed the desire of TL truck drivers to have career advancement opportunities. It was also found that most TL drivers value home time and rest very highly. Therefore, the implementation of a per hour pay scale seems effective. This redefined pay scale would allow drivers to both make more money, as well as be rewarded with shorter hauls and more home time as they gained seniority. As stated previously, the current per mile system forces senior drivers to continue to take long hauls in order to maximize their pay per mile increases. In the redefined pay system, newer drivers would drive the long hauls while senior drivers would receive more short haul assignments.

Future Research:

Things like price competition and signing bonuses have only caused trucking companies to work against each other. The changes implemented by trucking companies to this point have been in the interest of company, as opposed to the industry in general. This has only furthered the current issues. If one company offers a bonus, all of the drivers will shift to that company. Then, when another company offers a bonus, those same drivers will shift to that company. This creates a never ending and vicious cycle. Government policy would affect all companies equally, and would present a solution that would both solve the problems and keep the playing field level amongst trucking companies. The vast number and varying sizes of trucking companies makes it implausible that driver turnover and the driver shortage could be solved by industry cooperation alone.

Moving forward, future research could focus more on the unionization of truck drivers. In the past, unions seemed to maintain a level of satisfaction amongst truck drivers. It would be very interesting to research methods of increasing union membership without choking out non-union companies. Studying the human resources side of the trucking industry presents would present an interesting opportunity as well. This project focused mostly on the economics of this issue; however, there are many other issues present in the industry that deal with employee policy, employee treatment, and working conditions.

Summative Comments:

I used this project as an opportunity to combine my two disciplines of logistics and economics in a cohesive and analytical manner. Although logistics is my main field of focus, I have found time and time again that economics serves as both the basis and the law by which every industry operates. Therefore, I figured that combining logistics and economics in my thesis would not only allow me to critically analyze both fields, but also to present a unique set of solutions to the problems in the trucking industry. Before beginning this project, I vastly underestimated both the size and the scope of the issues in the trucking industry, as well as the difficulty in solving these issues. As I did more and more research, it became clearer as to why the trucking industry has been unable to solve this issue in over two decades. Everything in the industry is interdependent on everything else. Because of this, every potential solution that is implemented will cause a variety of effects, both intended and unintended. The challenge in dealing with this type of situation is finding solutions that not only maximize the good effect on the industry, but also minimize the negative fallout.

Completing this thesis benefitted me in two major ways. First, the amount and depth of research associated with the project allowed me to grow immensely in my knowledge of logistics and economics. Reading large amounts on both subjects served to educate me on facets of both disciplines that I would not have studied otherwise. Secondly, this thesis allowed me to transform from a student to a professional. As a student, I was taught the basics of both logistics and economics. Everything that I learned was from textbooks and planned courses of study. This type of study provided the foundation for my thesis. Completing the thesis allowed me to apply this knowledge to a real world situation. It familiarized me with the types of issues that industry professionals are actually solving, and their methodology in solving these issues. Because of this, I feel like a much more rounded student. Not only do I have a complete understanding of the foundations of both disciplines, but I am also familiar with current industry situations, and the way in which university studies are applied to the professional world. This experience has been invaluable to me as a student and emerging professional.

References

Badkar, M. (2014, August 4). *There's A Huge Shortage Of Truck Drivers In America - Here's Why The Problem Is Only Getting Worse*. Retrieved December 12, 2015, from http://www.businessinsider.com/americas-truck-driver-shortage-2014-7

Banker, S. (2013, September 3). *What Truck Driver Shortage?*. Retrieved December 3, 2015, from http://www.forbes.com/sites/stevebanker/2013/09/03/what-driver-shortage/

Berman, J. (2015, October 6). *ATA report drives home the dire situation the driver shortage remains in.* Retrieved December 2, 2015, from http://www.logisticsmgmt.com/article/ata_report_drives_home_the_dire_situation_the_driver_shortage_remains_in

Beyond Supply and Demand. (n.d.). Retrieved December 3, 2015, from https://courses.byui.edu/econ_150/econ_150_old_site/lesson_04.htm

Brashares, J. (2013, July). *Intermodal Transportation's Strategic Advantage.* Retrieved December 3, 2015, from http://www.inboundlogistics.com/cms/article/intermodal-transportations-strategic-advantage/

Bright, S., Cockrell, N., Munawar, M., Netzer, C., Paston, T. & Thias, T. (2015, May). *Commodity Structure Group Analysis* [Powerpoint Slides].

Cassidy, W. (2015, April). *US truck driver shortage getting worse, turnover figures show.* Retrieved December 3, 2015, from http://www.joc.com/trucking-logistics/labor/us-truck-driver-shortage-getting-worse-turnover-figures-show_20150401.html

Chao, L. (2015, June 23). *Driver Shortage Ripples Across Trucking Industry.* Retrieved December 12, 2015, from http://www.wsj.com/articles/driver-shortage-ripples-across-trucking-industry-1435057224

Engel, C. (1998, April). *Competition Drives the Trucking Industry*. Monthly Labor Review. Retrieved December 3, 2015, from http://www.bls.gov/mlr/1998/04/art3full.pdf

Freight Transportation Modal Shares: Scenarios for a Low - Carbon Future. (2013, March). Retrieved December 3, 2015, from http://www.nrel.gov/docs/fy13osti/55636.pdf

Heakel, R. (2003, November 30). *Economics Basics: Supply and Demand | Investopedia.* Retrieved December 12, 2015, from http://www.investopedia.com/university/economics/economics3.asp

Hirsch, B., & MacPherson, D. (1997). *Earnings and Employment in Trucking: Deregulating a Naturally Competitive Industry*. Retrieved December 3, 2015, from http://www.trinity.edu/dmacpher/Pdfs/HM_Trucking Chapter.pdf

Litman, T. (2013, March 12). *Understanding Transport Demands and Elasticities How Prices and Other Factors Affect Travel Behavior.* Retrieved December 3, 2015, from http://www.vtpi.org/elasticities.pdf

Meyers, S. (2015, November 4). *Unprecedented Truck Driver Shortage Could Impact National Economy, Says Industry Expert.* Retrieved December 12, 2015, from http://www.wpr.org/unprecedented-truck-driver-shortage-could-impact-national-economy-says-industry-exp

Min, H., & Lambert, T. (2002). *Truck driver shortage revisited.* Transportation Journal, 42(2), 5-16. Retrieved from http://proxy.bsu.edu/login?url=http://search.ebscohost.com/login.aspx?direct=true&db=mth&AN=9389603&site=ehost-live&scope=site

Parming, V. (2013). *Competition and Productivity in the US Trucking Industry Since Deregulation.* Retrieved December 3, 2015, from http://transportation.mit.edu/sites/default/files/documents/MIT_Trucking_Productivity_Report_2013.pdf

Raising the Minimum Wage: The Effects on Employment, Businesses and Consumers - ALEC - American Legislative Exchange Council. (2014, March 1). Retrieved December 3, 2015, from http://www.alec.org/publications/minimum-wage/

Reports, Trends & Statistics. (n.d.). Retrieved December 3, 2015, from http://www.trucking.org/News_and_Information_Reports.aspx

Rodrigue, J., & Notteboom, T. (2013). *Transport Supply and Demand.* Retrieved December 3, 2015, from https://people.hofstra.edu/GEOTRANS/eng/ch7en/conc7en/ch7c4en.html

Rodriguez, J., Kosir, M., Lantz, B., Griffin, G., & Glatt, J. (n.d.). *The Costs of Truckload Driver Turnover*. Retrieved December 3, 2015, from http://www.ugpti.org/pubs/pdf/SP146.pd

Search for Positions. (n.d.). Retrieved December 3, 2015, from http://www.werner.com/content/employment/search_for_positions/

Supply Chain Gain: Trucking Tactics. (2011). Retrieved December 12, 2015, from http://www.inboundlogistics.com/cms/article/supply-chain-gain-trucking-tactics/

Szulczyk, K. (n.d.). *Review - Supply and Demand Lecture 2*. Retrieved December 12, 2015, from http://www.ken-szulczyk.com/economics/tourism_02.php

Terreri, A. (2004, July 1). *Intermodal Shows its Mettle.* Retrieved December 3, 2015, from http://www.inboundlogistics.com/cms/article/intermodal-shows-its-mettle/

Trucking companies raise wages as driver shortage grows. (2014, September 25). Retrieved December 12, 2015, from http://www.ibj.com/articles/49667-trucking-companies-raise-wages-as-driver-shortage-grows

Wise as Serpents. (2013, August 16). Retrieved December 12, 2015, from http://economicsandcompassion.blogspot.com/2013/08/minimum-wage-part-1.html

Zografos, K., & Recker, A. (2003, August 1). *Current Challenges for Intermodal Freight Transport and Logstics in Europe and the US.* Retrieved December 3, 2015, from http://www.its.uci.edu/its/publications/papers/CLIFS/UCI-ITS-LI-WP-03-4.pdf